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Abstract

The initial turbine stage design by GTRE for their GTX engine had some scope for improvement in performance with regard to surface loading distribution. This aspect was required to be looked into through this sponsored project by GTRE. The cooled rotor blade profiles designated as P-27/GTX-35 (Scheme 8) were redesigned to relieve the excessive forward loading of the existing design and to achieve moderate diffusion along the suction surface. The redesign and modification of these blade profiles were carried out through an iterative procedure using both design and analysis solutions based on singularity method. The redesign of turbine blade was carried out at tip, mean and hub sections. Blade parameters like pitch, chord, throat, inlet and outlet flow angles were maintained more or less same as that of the given blade profile. Blade camber, stagger and thickness were allowed to vary to get the required velocity distribution. The redesigned tip and mean profiles showed an improvement in velocity distribution. The hub profile was not modified but only re-oriented at reduced stagger and analysed theoretically. This work was sponsored and funded by GTRE, Bangalore for the development of their turbine stages.